

In the Claims:

1-42. (Canceled)

43. (Currently amended) A device comprising a first polymer substrate layer having a plurality of mesoscale channels therein, at least one of which has a width of between about 2.0 and 200 microns ~~fabricated thereon~~, which first polymer substrate layer is overlaid by a cover layer, which cover layer comprises a transparent portion, whereby the plurality of channels are sealed between the first polymer substrate layer and the cover layer.

44. (Previously added) The device of claim 43, wherein the cover layer and the first substrate layer are adhered.

45. (Previously added) The device of claim 43, wherein the first polymer substrate is formed by molding the polymeric substrate.

46. (Previously added) The device of claim 43, wherein the cover layer comprises glass.

47. (Previously added) The device of claim 43, wherein the cover layer comprises a material other than glass.

48. (Previously added) The device of claim 43, wherein the cover layer comprises a plastic.

49. (Previously added) The device of claim 43, wherein the cover layer comprises a plastic sheet.

50. (Currently amended) The device of claim 43, wherein the ~~flow~~ mesoscale channels are fabricated on the first substrate layer by at least one of spin coating and vapor deposition, photolithography, wet chemical etching and plasma processing.
51. (Currently amended) The device of claim 43, further comprising a second cover layer bonded to the first substrate layer.
52. (Previously added) The device of claim 43, wherein the plurality of channels intersect at a plurality of intersections.
53. (Currently amended) The device of claim 43, wherein the channels are between about 0.5 and 500 microns in depth ~~at least one channel dimension~~.
54. (Currently amended) The device of claim 43, wherein the plurality of channels are fabricated in the first substrate layer by wet chemical etching ~~between about 2 and 500 microns wide and between 0.1 and 500 microns deep~~.
55. (Previously added) The device of claim 43, further comprising a sample inlet port coupled to at least one of the plurality of channels.
56. (Previously added) The device of claim 43, further comprising at least one source of at least one biological material.

57. (Previously added) The device of claim 56, wherein the biological material comprises at least one of blood, plasma, serum, urine, sputum, saliva, cells and antibodies.
58. (Previously added) The device of claim 56, wherein the at least one source of at least one biological fluid is connected to a sample inlet port, which sample inlet port is coupled to at least one of the plurality of channels.
59. (Currently amended) The device of claim 43, further comprising an appliance, the appliance comprising a nesting site for receiving the first substrate layer when overlaid by the transparent cover layer.
60. (Previously added) The device of claim 59, the appliance comprising a conduit for delivering source of sample material to at least one of the plurality of channels.
61. (Previously added) The device of claim 59, the appliance comprising an injector for injecting a sample into contact with at least one of the plurality of channels.
62. (Previously added) The device of claim 61, wherein the injector is a pressure injector and the appliance further comprises a pressure detector.
63. (Previously added) The device of claim 59, wherein the cover layer comprises a sample inlet port fluidly coupled to at least one of the plurality of channels,

the appliance comprising a flow line coupled to the sample inlet port.

64. (Previously added) The device of claim 59, further comprising one or more valves in the appliance or in contact with one or more of the plurality of channels, which one or more valves regulates fluid flow.
65. (Previously added) The device of claim 43, further comprising means for sample movement.
66. (Previously added) The device of claim 43, further comprising means for reagent movement.
67. (Previously added) The device of claim 43, further comprising a detection region within at least one of the channels.
68. (Previously added) The device of claim 43, further comprising a conductivity sensor in at least one of the channels.
69. (Previously added) The device of claim 43, further comprising a pressure sensor in at least one of the channels.
70. (Previously added) The device of claim 43, further comprising an optical detector proximal to channel for detecting an optically detectable moiety within the channel.
71. (Previously added) The device of claim 70, wherein the optical detector comprises a spectroscope.

72. (Previously added) The device of claim 70, wherein the optical detector comprises a microscope.
73. (Previously added) The device of claim 70, wherein the optical detector comprises a light source.
74. (Previously added) The device of claim 70, wherein the optical detector comprises a camera.
75. (Previously added) The device of claim 70, wherein the optical detector detects a fluorescent or luminescent signal in a detection region coupled to or within a channel of the device.
76. (Currently amended) The device of claim 43, further comprising a tilting mechanism for tilting the first substrate layer when overlaid by the cover layer.
77. (Previously added) The device of claim 43, further comprising a detection region within at least one mesoscale channel or chamber of the device, the detection region comprising a polymer bead disposed therein.
78. (Currently amended) The device of claim 43, further comprising a plurality of electrical contacts configured to resistively heat a portion of the first substrate layer.
79. (Previously added) The device of claim 43, further comprising temperature control means for controlling the temperature of a portion of the device.

80. (Previously added) The device of claim 43, further comprising an inlet port and a source of a plurality of sample materials, which, during operation of the device, are flowed through the inlet port and into at least one of the plurality of channels.
81. (Previously added) The device of claim 43, the device further comprising an inlet port and a plurality of source of separate sample materials, which, during operation of the device, are flowed through the inlet port and into at least one of the plurality of channels.
82. (Currently amended) The device of claim 43, wherein the first substrate layer is a few millimeters thick.
83. (Currently amended) The device of claim 43, wherein the first substrate layer and cover layer are each between 0.2 and 2 centimeters square.
84. (Currently amended) The device of claim 43, wherein the first substrate layer is manufactured from a polytetrafluoroethylene.
85. (Previously added) The device of claim 43, wherein the total volume of the plurality of channels is less than 10 microliters.
86. (Previously added) The device of claim 43, wherein the channels comprise at least one surface coating.
87. (Previously added) The device of claim 43, further comprising a magnetic bead disposed within one or more of the plurality of channels.

88. (Previously added) The device of claim 87, further comprising a magnetic field source of directing movement of the magnetic bead.
89. (Previously added) The device of claim 43, wherein at least one of the channels varies in width along the length of the at least one channel.
90. (Previously added) The device of claim 43, further comprising a pump coupled to a port coupled to at least one of the plurality of channels.
91. (Currently amended) The device of claim 43, further comprising reagents for PCR amplification disposed within at lease one of the channels of the device.
92. (Previously added) The device of claim 43, further comprising a microprocessor coupled to a detector which is mounted proximal to the cover layer.
93. (Previously added) The device of claim 43, wherein the plurality of channels comprise at least one sample and at least one control region.
94. (Previously added) The device of claim 43, further comprising a microprocessor coupled to a detector which is mounted proximal at least one sample and at least one control region, which microprocessor compares data from the sample and the control region.